REMARKS

Claims 1, 10 and 19 have been amended. Claims 1-27 are pending. Reconsideration of claims 1-27 is kindly requested in view of the following remarks.

Claims 1, 3, 6, 8, 10, 12, 15, 17, 19, 21, 24 and 26 stand rejected as anticipated by U.S. Patent Publication No. 2003/0118094 to Wang ("Wang"). Claims 2, 11 and 20 stand rejected as obvious in view of Wang and U.S. Patent Publication No. 2002/0021750 to Belotserkovsky ("Belotserkovsky). Claims 4, 5, 13, 14, 22 and 23 stand rejected as obvious in view of Wang and U.S. Patent Publication No. 2003/0091111 to Vaananen ("Vaananen"). Finally, claims 7, 9, 16, 18, 25 and 27 stand as objected to, but allowable if written in independent form. The applicant respectfully traverses the rejection of claims 1-6, 8, 10-15, 17, 19-24 and 26, and requests reconsideration of these claims for the reasons noted below.

Claims 1-9, 10-18 and 19-27 respectively claim methods, computer program products and receivers for determining the parameters of a *continuous* communication channel tap model, including calculating one or more sets of adaptively updated channel taps, and "fitting the one or more sets of adaptively updated channel taps to update the parameters of the *continuous* channel tap model." The Examiner argues that Wang discloses "fitting" the parameters of the continuous communication channel tap model by "applying an LMS algorithm to fit the time or frequency domain equalizer." *Office Action* at p. 2. The applicant respectfully disagrees.

The Examiner confuses using a conventional LMS algorithm (which Wang discloses) to find a discrete set of updated channel taps, with fitting a plurality of such discrete sets of channel taps to determine the parameters of a continuous channel tap model (which applicant discloses and recites in claims 1-27). For example, in FIG. 1 the applicant discloses a DSP 100 that includes an initial channel estimator 150, a channel tracker 170 and an equalizer 160. DSP 100 runs an "(LMS) algorithm in channel tracker 170 to update the channel tap vector *h(k)* that is programmed into equalizer 160." *Application* at 5. Using the LMS algorithm, "channel tracker 170 can adaptively update or track the channel taps programmed into equalizer 160 on a *discrete* or *per symbol* basis." *Id.* at 6. (emphasis added). In addition to discretely and conventionally updating the channel tap vector by running the LMS algorithm, channel tracker 170 can also

"track the channel taps that are programmed into equalizer 160 on a continual basis using the method disclosed" in FIG 3. *Id.*

In FIG 3, the applicant discloses an iterative method that can be used by channel tracker 170 "to program a [continuous] channel tap model into equalizer 160. Through the channel tap model . . . equalizer 160 is able to *continually* track the time-dependence of the channel taps." *Id.* at 7 (emphasis added). According to the method disclosed in FIG. 3, channel tracker 170 first obtains "sets of iteratively updated channel taps using the LMS algorithm . . . [then] fit[s] these sets of updated channel taps to a time-dependent channel tap model to determine the parameters of the channel tap model." *Id.* As a result, the channel tap vector is modeled as a continuous function of time, *h(t)*, as shown in Eqtn (3) (p. 8), rather than as a discrete function of symbol, *h(k)*, as shown in Eqtn (1) (p. 5).

Wang fails to disclose or even suggest fitting a plurality of discretely obtained channel tap vectors to obtain the parameters of a continuous channel tap model as recited in claims 1-9, 10-18 and 19-27. Instead, Wang discloses running a conventional LMS algorithm to model changes in the channel tap vector as a sequence of discrete channel tap vectors, *h(k)*, where *k* is the *kth* symbol. For example, Wang discloses "an on-line TEQ training algorithm implemented in mixed time and frequency domains. The first step of the . . . algorithm estimates a channel h(n) and initializes TEQ coefficients w(n)." *Wang* at ¶ 40. After initialization, Wang discloses entering a "channel-updating phase" which discretely updates the channel taps w(n) of equalizer TEQ 18 using a conventional LMS algorithm. *Id.* at ¶ 49. For example, Wang discloses updating the TEQ 18 tap weights w(n) "sample-by-sample, and the LMS algorithm is performed on each sample." *Id.* at ¶ 50. Wang further discloses that "the weight of the L-tap FIR filter may be updated for every sample by using the LMS algorithm . . . wherein $w(n) = [w_0(n)\ w_1(n) \ldots w_{L-1}(n)]^T$ represents the tap-weight vector of the TEQ at time n." *Id.* at ¶¶ 51-52. In a preferred embodiment, Wang updates the TEQ channel tap weights "512 times before entering the channel-estimating phase for a different sample." *Id.* at ¶ 52. Thus, Wang's algorithm does little more than find a plurality (512) of discrete tap weight vectors for equalizer TEQ 18. Nowhere does Wang disclose or suggest fitting these tap weight vectors to find or "update the parameters

of [a] continuous channel tap model" as recited in claims 1-9, 10-18 and 19-27. Consequently, Wang fails to anticipate claims 1, 3, 6, 8, 10, 12, 15, 17, 19, 21, 24 and 26 as suggested by the Examiner, and the rejection of these claims for this reason should be withdrawn.

Claims 2, 11 and 20 stand rejected as obvious in view of Wang and Belotserkovsky. The Examiner relies on Wang to teach "all the subject matters claimed [in claims 1, 10 and 19] except for obtaining a first set of channel taps from an input data stream containing a training data stream and a locally generated copy of the training data stream, and initializing the parameters of the channel tap model with the first set of channel taps." *Office Action* at 3. The Examiner relies on Belotserkovsky to teach these latter limitations. Notably, the Examiner does not rely on Belotserkovsky to teach or suggest "fitting the one or more sets of adaptively updated channel taps to update the parameters of the continuous channel tap model" as recited in claims 2, 11 and 20. Nor can the Examiner, as Belotserkovsky teaches a convention adaptive tap weight algorithm that is "configured to generate an initial equalizer tap setting based on a training symbol . . . and to generate subsequent tap settings based on data symbols and an adaptive algorithm." *Belotserkovsky* at ¶ 23. In other words, Belotserkovsky teaches generating discrete or per symbol tap settings rather than a continuous channel tap model by fitting such discrete tap settings as recited in claims 2, 11 and 20. Consequently, these claims are patentable over the combination of Wang and Belotserkovsky for at least this reason, and the Examiner's rejection should be withdrawn.

Claims 4, 5, 13, 14, 22 and 23 stand rejected as obvious in view of Wang and Vaananen. The Examiner relies on Wang to teach "all the subject matter claimed [in claims 1, 10 and 19], except for fitting the one or more sets of adaptively updated channel taps to a channel tap model that is linear in time." *Office Action* at 4. The Examiner relies on Vaananen to teach this limitation, finding that Vaananen teaches in ¶¶ 20 and 54 "an adaptive equalizer . . . that is linear in time." The applicant respectfully disagrees, as the Examiner confuses the linear equalizer disclosed in Vaananen with a linear channel tap model.

As is known in the art, a linear equalizer is a device that is used to recover a transmitted data symbol x(k) from a received sequence of data symbols y(k) by linearly weighing previously

received symbols with weights from a tap weight vector h_k, i.e., $x(k) = \sum h_j y(j) = h_0\, y(0) + h_1\, y(1) + \ldots + h_k\, y(k)$. The tap weight vector corrects for channel distortion, and can either be constant in time (e.g., to correct for a stationary channel's distortion), or can vary in time (e.g., to correct for a non-stationary channel's distortion). In the latter case, each of the tap weights h_k in the tap weight vector will be a function of time (i.e., $h_k(t)$) which may or may not be a linear function of time. For example, as shown in Eqtn (3) on page 8, the tap weights can be a linear function of time (e.g., $h_k(t) = a_k \cdot t + h_k(0)$). Alternatively, the tap weights can be a quadratic function of time (e.g., $h_k(t) = b_k \cdot t^2 + a_k \cdot t + h_k(0)$). In either event, and regardless of whether the tap weights are linear, quadratic, or any other functions of time, the equalizer that uses the tap weights remains a linear equalizer since it recovers the transmitted symbol $x(k)$ as a linearly tap-weighted sum of previously received symbols. Thus, while Vaananen discloses a linear equalizer, it fails to disclose or even suggest parameterizing the equalizer's tap weights with a channel tap model that is linear in time, i.e., with tap weights $h_k(t) = a_k \cdot t + h_k(0)$. Moreover, lacking a channel tap model, Vaananen fails to disclose or event suggest "fitting . . . one or more sets of adaptively updated channel taps to update the parameters of the continuous channel tap model" as recited in claims 4, 5, 13, 14, 22 and 23. Consequently, these claims are patentable over the combination of Wang and Vaananen for at least these reasons.

All claims are believed to be in condition for allowance, which action is kindly requested. No fees are believed due, however, please apply any applicable charges or credits to deposit account 06-1050.

Respectfully submitted,

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